

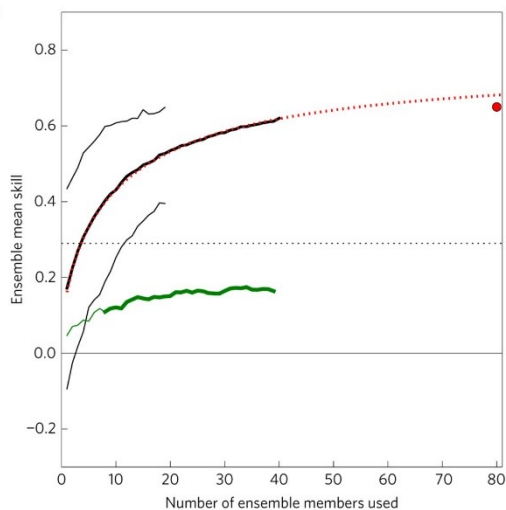
Met Office (UK) Research & modelling centre update GloSea6 & DePreSys4

Skilful predictions of the winter North Atlantic Oscillation one year ahead

[Nick Dunstone](#) , [Doug Smith](#), [Adam Scaife](#), [Leon Hermanson](#), [Rosie Eade](#), [Niall Robinson](#), [Martin Andrews](#) & [Jeff Knight](#)

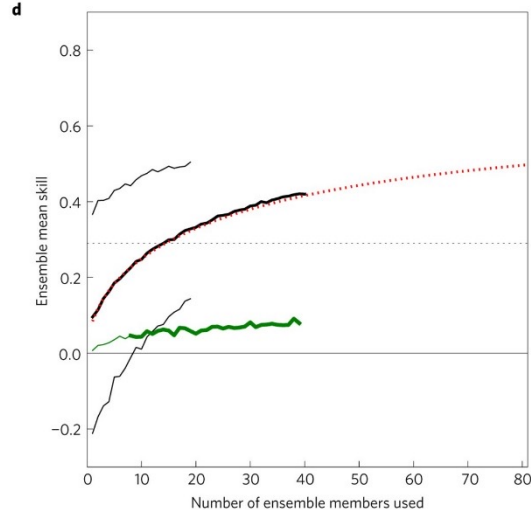
Nature Geoscience **9**, 809–814 (2016) | [Cite this article](#)

1st winter



Dunstone et al 2016

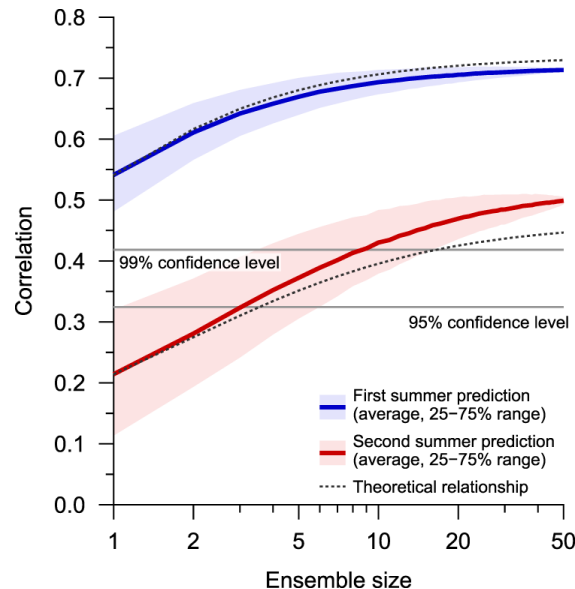
2nd winter



Skilful predictions of the Asian summer monsoon one year ahead

[Yuhei Takaya](#) , [Yu Kosaka](#), [Masahiro Watanabe](#) & [Shuhei Maeda](#)

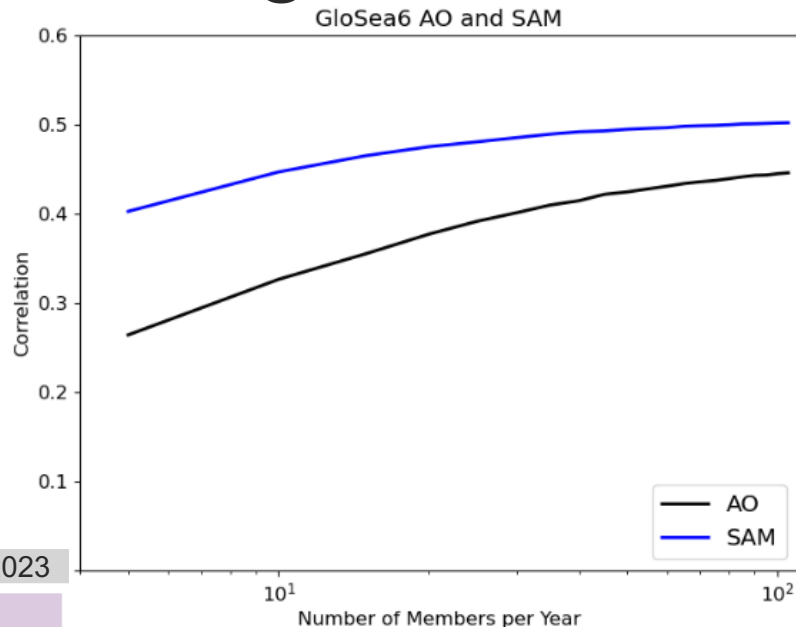
Nature Communications **12**, Article number: 2094 (2021) | [Cite this article](#)



Takaya et al 2021

GloSea6: Large Ensembles for seasonal forecasting

- MO plans to implement a 100 member seasonal forecast ensemble in 2024
 - Increases skill
 - Reduces uncertainty in bias correction
 - Supports 'UNprecedented Simulated Extremes using Ensembles' (UNSEEN)
- Introduced wind predictions in addition to temperature and precipitation to UK outlook



Wind speed

April – June 2023

25%

chance the season will be

CALM

1.3×



the normal chance

60%

chance the season will be

**NEAR
AVERAGE**

1.0×



the normal chance

15%

chance the season will be

WINDY

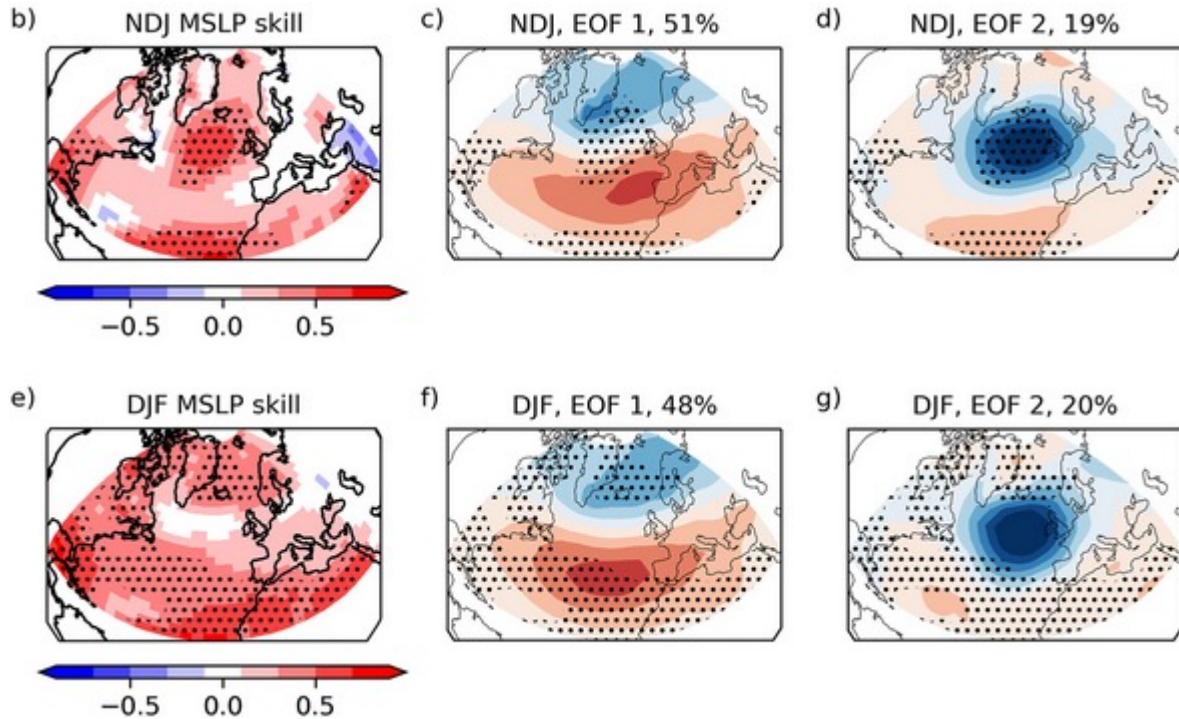
0.8×



the normal chance

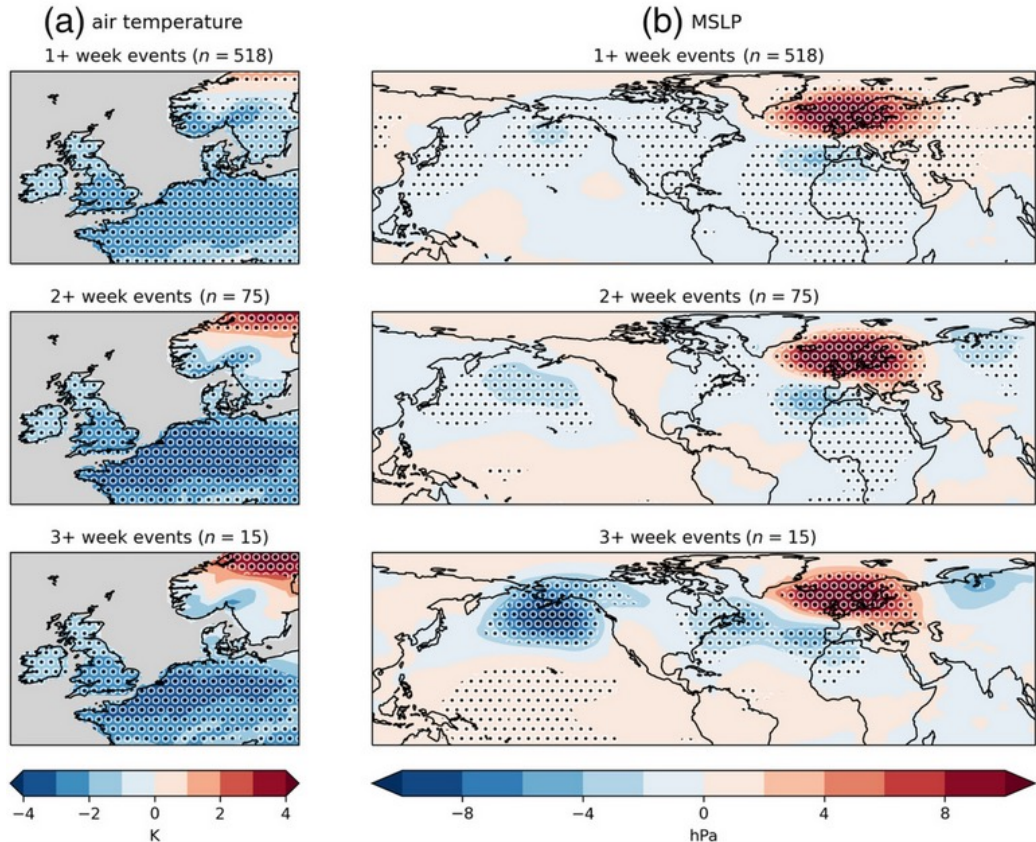
Seasonal Predictability of the East Atlantic Pattern in Late Autumn and Early Winter

- Sea-level pressure skill evolves through seasons
- Seasonal forecasts from IRI data base (8 systems)
- NDJ high EAP & low NAO skill
- DJF low EAP & high NAO skill
- Reflects evolution of ENSO teleconnections thru winter
- Model tropical–extratropical teleconnections are weak compared to observations
- [Thornton et al \(2022, GRL\)](#)



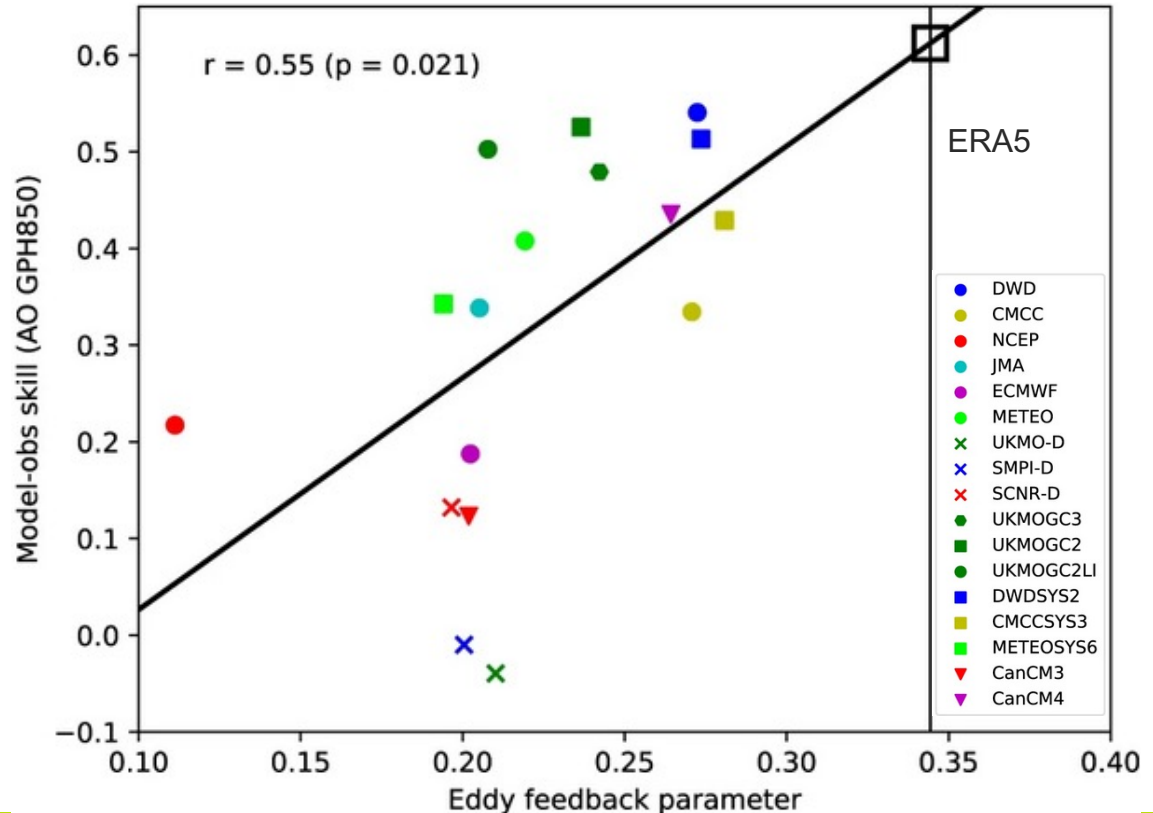
Potential for winter wind droughts

- UNSEEN methodology using decadal hindcasts: [Kay et al \(2023, ASL\)](#)
- Potential for more and longer UK wind droughts than seen in observations (for last 60 winters)
- Associated with high pressure and cold weather
- Long wind droughts may be linked to ENSO



Eddy Feedback and Skill in AO

- Eddy feedback on NH jet in models is related to skill in seasonal forecasts of the AO
- DJF 2-4 months lead-time
- All models are deficient in eddy feedback cf ERA5
- Improved eddy feedback could improve forecasts and address the signal-to-noise problem
- [Hardiman et al \(2022, npj Clim At Sci\)](#)

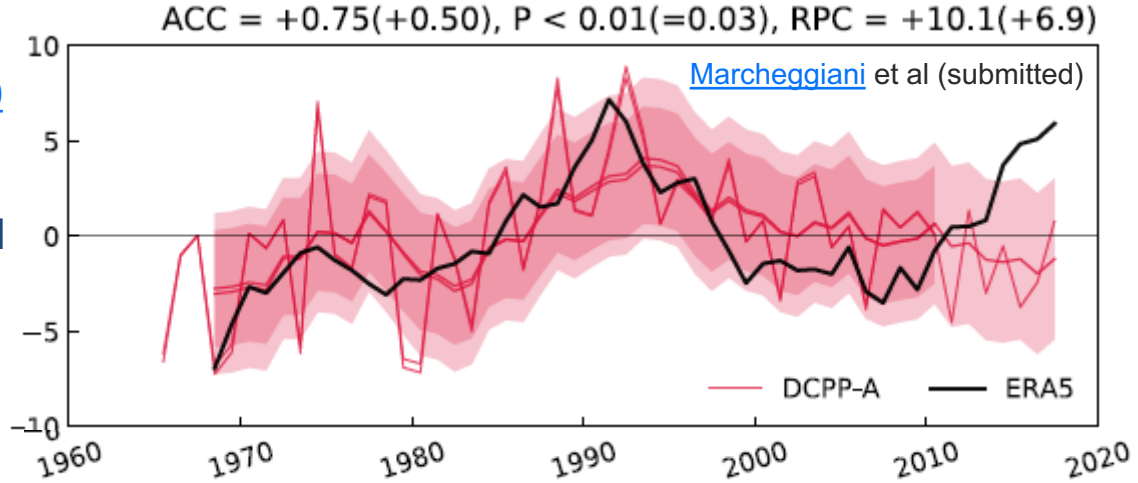
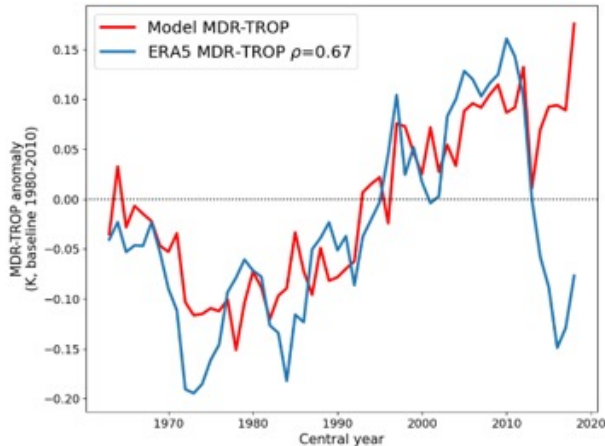


- Paper submitted on ocean re-analysis used to initialise hindcasts & forecasts
- Porting to new supercomputer, which will allow quadrupling of ensemble size to 40 members
- New decadal prediction system based on Global Configuration 5 of HadGEM3-MM to contribute to CMIP7 (2025?)
- Interannual hindcasts: 1980-2022; initialized May & Nov; 28 months; 40 members

Loss of decadal skill in recent years

- Updated [Smith et al \(2020, Nature\)](#) NAO skill years 2-9
- Skill falls when 2012-2018 included hindcast period

(f) Timeseries of obs and model MDR-TROP



- Atlantic tropical cyclones are predictable years 1-5 using an SST index: MDR - Tropics
- Since 2012, this index is no longer well predicted
- Lockwood et al (submitted)